Hindawi
Discrete Dynamics in Nature and Society
Volume 2023, Article ID 2381131, 20 pages
https://doi.org/10.1155/2023/2381131

Research Article

The Differential Moderating Effect of Executive Compensation on Innovation Investment and Cash Holding Value in China

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Received 13 October 2022; Revised 24 May 2023; Accepted 9 June 2023; Published 21 June 2023

Academic Editor: Xiaoquan Wang

In the context of technological innovation promoting the long-term sustainable development of enterprises, how to better motivate senior executives to create greater value for an enterprise is being widely discussed. In particular, the COVID-19 outbreak has raised concerns about whether companies can deliver more value by holding large amounts of cash. However, although scholars have conducted a lot of research on topics such as innovation and firm value, how differentiated executive compensation incentives regulate the relationship between firm innovation and the value of cash holdings has hardly been explored. This paper selects the balanced panel data of 1470 A-share listed companies from 2012 to 2020 in China to explore the relationship between innovation investment, executive compensation, and the value of cash holdings. It is found that innovation investment has a positive impact on the value of the cash holdings. Based on Herzberg's hygiene motivational factors, different types of executive compensation may have a hygiene effect or a motivational effect, which is different. As a result, the moderating effect of executive compensation on innovation investment and the value of cash holdings are significantly different. Executive equity compensation and in-service consumption are motivational attributes. They have a positive moderating effect on innovation investment and the value of cash holdings. The moderating effect of executive monetary compensation on innovation investment and the value of cash holdings changes with the change in monetary compensation. When monetary compensation is lower than the threshold value, monetary compensation is reflected as a hygiene attribute, so it has no significant positive moderating effect on innovation investment and the value of cash holdings. When monetary compensation is higher than the threshold value, monetary compensation is reflected as a motivational attribute, so it has a significant positive moderating effect on innovation investment and the value of cash holdings. Meanwhile, it is tested that monetary compensation is not manipulated by executive compensation defense behavior when it is reflected as motivational attributes.

1. Introduction

In the post-financial crisis era, especially with the spread of COVID-19 in 2019 and the crisis of a number of US banks in 2023, we can see that the concept of "cash is king" is increasingly pursued by company managers. Local financial development is an important driving factor for corporate cash holding policies [1]. Additional cash holdings are more valuable for companies with severe financial strains or low existing liabilities [2]. Meanwhile, it will lead to a high level of cash holdings [3]. As shown in Figure 1, from 2012 to 2021 (data come from the CSMAR database), the average proportion of cash assets in the total assets of listed companies in Shanghai and Shenzhen stock exchanges exceeds 15% every year. Moreover, since the outbreak of COVID-19 in 2019, the proportion of corporate cash holdings has shown an obvious upward trend, and the large amount of corporate cash holdings has made scholars more interested in corporate cash holdings. The large amount of corporate cash holdings makes scholars more interested in them. Although cash assets are highly liquid, their profitability is poor. Holding a large amount of cash is a waste of corporate resources, but why do companies still hold a large proportion of cash? Facing the phenomenon of large amounts of cash holdings, "the mystery of the value of cash holdings" is worth exploring deeply. How can large cash holdings better generate profits for the company and increase the value of cash holdings?

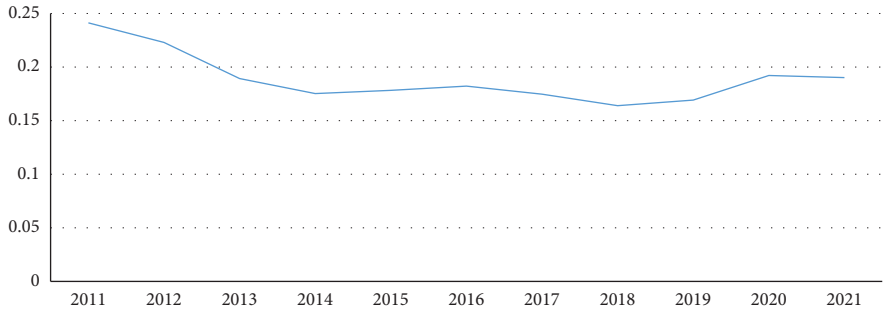

Figure 1: The ratio of cash holdings to total assets of China's A-share listed companies from 2011 to 2021.

Innovation is an important source for enterprises to maintain competitive advantages [2], as well as the soul of sustainable development of enterprises. Investment is an effective means for companies to realize value increments, so innovation investment should have the same role, that is to say, innovation is of great significance to corporate value. If we can find an effective meeting point between innovation and the value of cash holdings, we will find an effective path to enhance corporate value. Both innovation investment and cash holding behavior are the results of executive decisions, so the important role of executive behavior should be considered when studying the relationship between innovation investment and the value of cash holdings.

In the context of globalization, executive compensation increases rapidly [4]. However, it is a pity that the existing scholars have not gone deep enough into corporate innovation, executive behavior, and the value of cash holdings. The gaps in the present literature are mainly reflected in several aspects.

(1) Executive compensation is only divided into monetary compensation, equity compensation, etc., according to the form of executive compensation, but there is no in-depth analysis of the attributes of different types of compensation. Therefore, the conclusion is simple. For example, scholars have found that the executive compensation gap will increase the value of cash holdings of enterprises [5]. Of course, analyzing the attributes behind different types of executive pay is not easy. This is directly related to the direction and perspective of research. Fortunately, this study finds a suitable perspective for the classification of attributes of different types of executive compensation from the hygiene motivational factors theory proposed by Herzberg.

(2) Scholars have only conducted one-sided studies on the relationship between enterprise innovation, executive compensation, and the value of cash holdings. It is a pity that the existing scholars have not included the executive, corporate innovation and the value of cash holdings into a research framework. The reasons are as follows. On the one hand, there are many research perspectives on enterprise innovation, and scholars have not conducted in-depth discussion on the relationship between executive compensation, enterprise innovation, and the value of cash holdings. On the other hand, their relationship may change under different background conditions, and scholars have not found a more appropriate perspective and theoretical support to explain and analyze the relationship between them. Therefore, this study takes executive compensation incentive as the link between innovation and the value of cash holdings and in-depth analyzes the moderating effects of different executive compensation types on innovation and the value of cash holdings. At the same time, in order to make the theoretical basis of this research more sufficient, we carry out the research based on the speculative perspective of Herzberg's hygiene motivational factors theory, to ensure that this research is more scientific and widely applied.

According to the hygiene motivational factors theory, the factors causing executives' work motivation can be divided into incentive factors and motivational factors. The hygiene motivational factors proposed by Herzberg divide the factors causing executive motivation into motivational factors and hygiene factors. Motivational factors can bring satisfaction to executives and motivate them to improve their work efficiency. Hygiene factors do not give executives satisfaction or motivate them to perform their duties. When executive compensation plays different effects, the moderating effects on innovation investment and the value of cash holdings should be different. From the perspective of hygiene motivational factors, it can accurately distinguish the differential moderating effect of different types of executive compensation on innovation investment and the value of cash holdings, further study the mechanism of action, and find out ways to enhance the value of cash holdings more effectively.

The innovation and marginal contribution of the study are mainly reflected in the following aspects.

Firstly, from the perspective of hygiene motivational factors, this paper creatively proposed and tested executive compensation including hygiene factors and motivational factors. At the same time, the paper empirically tests the differential moderating effect of different types of executive compensation on innovation investment and the value of cash holdings, providing new development directions and empirical evidence for the development of hygiene motivational factors.

Secondly, the paper tested the moderating effect of executive monetary compensation on innovation investment, and the value of cash holdings changes with the change in monetary compensation. When monetary compensation is lower than the threshold value, monetary compensation is reflected as a hygiene attribute, so it has no significant positive moderating effect on innovation investment and the value of cash holdings. When monetary compensation is higher than the threshold value, monetary compensation is reflected as a motivational attribute, so it has a significant positive moderating effect on innovation investment and the value of cash holdings.

Thirdly, the paper explored the differential moderating effect of executive compensation on innovation investment and the value of cash holdings, providing theoretical support for improving corporate compensation design, and it provides ideas for enterprise value creation and long-term healthy development.

The organizational structure of this paper is as follows. Section 2 gives the theoretical analysis and research hypothesis. Section 3 introduces research design and describes the related variables. Section 4 is empirical analysis. Section 5 is the robustness test. Section 6 is further research. Section 7 summarizes the basic findings and insights of this study.

2. Theoretical Analysis and Research Hypothesis

2.1. Innovative Investment and the Value of Cash Holdings. The study of cash holding motivation further started scholars' enthusiasm for studying corporate cash assets [6]. On the one hand, scholars conducted research on the influencing factors of corporate cash holdings with the goal of optimal cash holdings. Some scholars studied how companies adjust their cash holdings through media reports [7] and whether female representation on the board of directors helps companies to obtain the best cash holdings [8]. On the other hand, they focused on exploring the value effect of corporate cash holdings. Scholars believe that, on the premise of an efficient capital market, the market valuation of corporate cash is the market value of corporate cash. A discount occurs when the market value of the company's cash is below its book price. Faulkender and Wang [9] studied non-financial listed companies in the United States and found that the marginal cash value of $1 of the company was $0.94. Naikang and Jinju [10] found that the market value of listed companies' cash assets of ¥1 is only ¥0.5-¥0.6 by measuring the marginal value of cash of listed companies in China, so the discount problem is more serious.

Based on different research samples, several scholars have concluded that the cash held by companies is discounted, and the degree of a cash discount of Chinese companies is more serious than that of companies from other countries. From the perspective of the market, the capital market in China has a late start and is not perfect, so the transmission efficiency of the cash value is low. From the perspective of the efficiency of cash, listed companies in China do not fully play the value of cash, so the problem of discounts is more serious.

Levels of forward-looking information disclosure [11], financial hedging [12], tax evasion [13, 14], corporate social responsibility fulfillment [15, 16], and product market competition [17–19] can improve the value of the company's cash holdings. Corporate cross-listing [20], related-party transactions [21], insider equity pledges [22], and corporate internationalization characteristics [23] will reduce the value of cash holding. Compared with non-state-owned enterprises, the value of cash holdings in state-owned enterprises is lower [24, 25], and enhancing the separation of the two rights of state-owned enterprises will lead to a lower value of cash holdings [13]. In particular, when the CEO of state-owned enterprises gets political promotion [26] or the separation of two powers increases [27], the value of cash holdings will be lower. Meanwhile, financing constraints have a strengthening effect on the value of cash holdings in non-state-owned companies, while the effect is not significant in state-owned companies [19]. In addition, audit pricing [28], corporate uncertainty [29], types of institutional investors [30], the macroeconomic environment [31, 32], and corporate governance environment [17, 33, 34] will have a significant impact on the value of cash holdings.

When companies measure the benefits and costs of cash holdings, the investment motivation in cash holding motivation theory just provides the possibility for cash holdings to bring benefits. When companies face more investment opportunities, holding cash can avoid financial difficulties [35]. Therefore, the mechanism of innovation investment with the value of cash holdings is analyzed from the following perspectives.

Innovative investments bring benefits to the company and enhance its cash value. Innovation is the inexhaustible driving force for the long-term development of the company, and holding cash is conducive to grasping good innovation investment opportunities. The transformation of innovation achievements has won competitive advantages for the company, and the value of cash holdings has been improved. Especially when the industry competition is very intense, good investment opportunities are essential for enterprises. When innovation investment is successful, it will bring abundant profits for enterprises. The continuous rise of corporate profits will enable enterprises to have better market performance, and the value effect of cash holdings will be more apparent.

Innovation investment can reduce a company's free cash flow. According to the free cash flow hypothesis, the high level of cash holdings increases the competition between executives and shareholders for control of company resources. As a result, the agency problem will become more serious and hurt the company's value. Innovation investment transforms the company's free cash into reserve investment funds, limits the scale of free cash flow, reduces the loss caused by internal friction, and improves the efficiency of the value of cash holdings.

Innovation investment sends a signal to the public about the company's long-term development. According to the signal transmission theory, the improvement of innovation investment level conveys to the public investors that the company has strong research and development ability,

abundant financial support, and better development prospects. Innovation investment can significantly increase a company's share price [36]. An increase in the company's stock price improves the confidence of public investors and is conducive to the further improvement of the company's value.

Holding cash is conducive to the improvement of enterprise R&D investment. Enterprise innovation investment is the recombination of production factors and production conditions. It will change the investment proportion of each factor inside the enterprise, which is conducive to improving the efficiency of enterprise resource allocation. In addition, innovation investment may involve important business secrets of enterprises, which should be kept secret by enterprises. Therefore, external financing constraints are relatively large, and enterprises can only rely on their own funds to fill the R&D gap. Some scholars have found that equity financing is negatively correlated with corporate performance [37]. Holding cash not only reduces the cost of external financings, such as equity financing, but also boosts investment, especially in research and development [38]. Therefore, from the perspective of financing order theory, cash held by companies is used for innovation investment with low cost, so the cost will reduce and the value of innovation investment will improve. In view of this, the following hypothesis is proposed.

Hypothesis 1. (H1) Innovation investment increases the value of cash holdings in the company.

2.2. The Moderating Effect of Executive Compensation on Innovation Investment and the Value of Cash Holdings under the Background of Hygiene Motivational Factors. The hygiene motivational factors theory holds that only motivational factors can bring satisfaction, while hygiene factors can only eliminate dissatisfaction, but not bring satisfaction. The improvement of motivational factors can better promote employees' work enthusiasm and improve work efficiency. The satisfaction of hygiene factors can only eliminate the dissatisfaction of employees but cannot stimulate the enthusiasm of employees, so it cannot promote the improvement of work efficiency. The hygiene motivational factors established Herzberg's important position in the field of motivation theory. Scholars have been continuously verifying and developing the hygiene motivational factors and enriching the relevant theoretical system. With the development of the motivation theory system, scholars have included teamwork [39], interest, and reputation motivation [40] into motivation factors.

However, some scholars have found that it is impossible to classify work characteristics by dichotomy [41]. Motivation factors do not bring greater job satisfaction than hygiene factors [42]. For this reason, Herzberg conducted a supplementary experiment to verify the stability of the conclusion of the hygiene motivational factors by expanding the investigation scope and enriching the investigation objects and supplementary investigation content [43]. Although scholars have different opinions on the hygiene motivational factors, it is undeniable that the hygiene motivational factors have strong application value in reality. Of course, maintaining critical thinking and exploring the hygiene motivational factors critically is an important driving force for academic progress.

Herzberg mentioned that hygiene factors and motivational factors are not completely opposite, and a certain incentive method may cover two factors. However, there are essential differences between hygiene factors and motivational factors. The motivational effect of the hygiene factor is not obvious, and the hygiene effect of motivational factors is also poor. Due to the differences in the social development stage and national conditions between China and other countries, there will be differences in whether the same incentive method is a motivating factor or a hygiene factor [44]. Herzberg thinks salary and bonus are hygiene factors. However, with the development of compensation design, equity compensation and in-service consumption have become an important part of executive compensation incentives. Equity compensation and in-service consumption are often related to work content. Equity compensation can motivate executives to work hard for the long-term interests of the company, which has a significant motivational factor attribute. In-service consumption is regarded as an invisible salary, which has greater uncertainty. When the company's performance is good, company executives are more likely to enjoy more office, travel, tourism, and other opportunities, so in-service consumption is highly correlated with the company's performance. In particular, with the increasingly strict salary control, in-service consumption has become an alternative for corporate executives to pursue high salaries [45]. Therefore, in-service consumption also has obvious motivational factors. Executive monetary compensation includes not only the salary and bonus of the company's executives but also the monetary compensation obtained in other forms. The compensation beyond salary and bonus is closely related to the value which executives can create for the enterprise, playing a motivational role that hygiene factors cannot complete, so it should have the attribute of motivational factors.

Therefore, from the perspective of adapting to the development requirements of the new era, the equity compensation and in-service consumption of corporate executives are motivational factors, while the monetary compensation includes hygiene factors as well as motivational factors.

The inverted position of executive compensation will inhibit the input and output of innovation [46]. Good corporate governance can improve the value of cash holdings in the company, and investors will give the company a higher cash pricing [47]. The monetary compensation of senior executives can effectively promote the R&D investment of enterprises, but the promotion effect of equity compensation is not obvious [48]. Some scholars have found that the characteristics of stakeholder networks are closely related to open innovation performance [49]. In particular, venture capital institutions promote open innovation by strengthening executive compensation incentives in the company [50]. The research of scholars also reflects the

important role that executive behavior can play in the relationship between innovation investment and the value of cash holdings. Because of the principal-agent conflict, the self-interested behaviors of managers are not conducive to the positive promotion effect of innovation investment on the value of cash holdings. As a widely recognized internal governance mechanism, executive compensation contract plays an important role in reducing agency costs. It is also possible that executive compensation can play an important moderating effect on the mechanism of innovation investment and the value of cash holdings.

From the perspective of increasing income, the transformation of innovation investment into enterprise value is inseparable from the effective management of senior executives. The conversion cost of corporate cash into executive private income is lower than that of other assets. Holding cash provides opportunities for the self-interested behavior of executives and limits the realization of the value of the company's cash holdings. Executive compensation with motivative attributes can effectively reduce the moral hazard of senior executives, encourage senior executives to concentrate on their work, and promote the convergence of senior executives' personal goals and corporate goals. Finally, the results of innovation investment bring the realization of enterprise value.

From the perspective of reducing free cash flow, the manipulation cost of cash is low, and corporate executives may manipulate the company's cash to build a "personal empire" and damage the value of the company [9]. By manipulating the free cash flow right, senior executives influence the increase of the value of cash holdings. The effective executive compensation mechanism reduces the agency cost of the company and can reduce the executive's control of free cash flow. Executive compensation with motivational attributes can effectively correct the negative impact of free cash flow.

From the perspective of signal transmission, in the context of the state's encouragement of technological innovation, executive compensation with motivative attributes encourages senior executives to devote themselves to technological research and development, so as to establish a positive social image for enterprises. At the same time, it also indicates that the enterprise has strong scientific research ability and market competitiveness, and the comprehensive strength is strong, which is conducive to the further improvement of the market value of the enterprise. On the contrary, due to information asymmetry, senior executives can manipulate the investment behavior of the enterprise, which will lead to the depreciation of the value of the company regardless of over-investment or under-investment. Executive compensation with motivative attributes also plays a normative role in the investment behaviors of corporate executives, constrains bad investment behaviors, improves corporate investment efficiency, and reduces cash wastage.

Based on the above analysis, different types of executive compensation have different attributes. It could be a motivational attribute or a hygiene attribute. When executive compensation plays a motivational attribute, it can effectively promote corporate earnings brought by innovation investment, reduce free cash flow, and better convey positive signals for enterprises. Therefore, it has a significant positive moderating effect on the mechanism of innovation investment and the value of cash holdings. The research model of this study is shown in Figure 2. Based on the above analysis, the following hypothesis is proposed.

Hypothesis 2. (H2) If executive compensation plays a motivational role, it has a significant positive moderating effect on innovation investment and the value of cash holdings.

3. Research Design

3.1. Sample Selection and Data Sources. A-share listed companies of Shanghai and Shenzhen stock exchanges from 2012 to 2020 in China are selected as the research objects. The missing individual data in the database are collected manually from the data disclosed on the official website of the listed company to ensure the integrity of the sample data. The sample data are sorted out as follows. (1) Exclude the data of financial companies. (2) Eliminate the data of ST and PT companies. (3) Eliminate data from companies with significant missing data. (3) Eliminate outliers and eliminate the influence of extreme values. (4) Exclude enterprises with an asset-liability ratio greater than 1 or less than 0. Audit fees, executive compensation, and other corporate financial data are derived from the CSMAR database, and enterprise innovation data are derived from the Wind database. Since innovation behavior is obviously long-term and sustainable, in order to ensure scientific research, we should choose to balance panel data for research. Therefore, companies that were delisted or newly listed during the study period were deleted. In order to ensure the validity of the data, all sample data (1%, 99%) were tailed, and finally, 10320 balanced panel data of 1470 listed companies were obtained. This paper mainly uses Stata 16.0 to process and analyze the data.

3.2. Model Construction and Variable Definition. Referring to the research method of Faulkender and Wang [9], the change in stock price caused by the change in the company's cash assets is used to measure the value of the cash holdings, that is, the influence of the change of cash holdings on the excess return rate of stock is used to measure the value of the cash holdings, and model (1) is constructed. In model (1), α_1 represents the influence of the change in the company's cash holdings on the excess return rate of the company's stock. When $\alpha_1 > 0$, it indicates that the change of cash has a positive impact on the value of the cash holdings, that is, the greater the change in the company's cash, the greater the value of the cash holdings. To measure the impact of innovation investment on the value of cash holdings, the proxy variable of innovation investment is introduced. Referring to the research of most scholars, the innovation investment level is measured by the ratio of the company's R&D expenditure to its operating revenue [51], and a higher ratio indicates a higher level of investment in innovation. When $\alpha_{10} > 0$, it indicates that innovation investment has

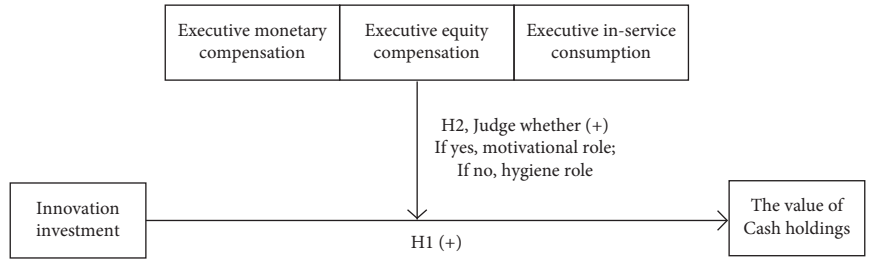

Figure 2: Research model.

a positive impact on the value of cash holdings. When $\alpha_{10} < 0$, it indicates that innovation investment has a negative impact on the value of cash holdings.

$$r_{i,t} - R_{i,t} = \alpha_0 + \alpha_1 \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \alpha_2 \frac{\Delta \text{Earning}_{i,t}}{\text{MV}_{i,t-1}} + \alpha_3 \frac{\Delta \text{NA}_{i,t}}{\text{MV}_{i,t-1}} + \alpha_4 \frac{\Delta \text{Int}_{i,t}}{\text{MV}_{i,t-1}} + \alpha_5 \frac{\Delta \text{Divi}_{i,t}}{\text{MV}_{i,t-1}} + \alpha_6 \frac{\text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} + \alpha_7 \text{Lev}_{i,t} + \alpha_8 \frac{\text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} * \frac{\Delta \text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} + \alpha_9 \text{Lev}_{i,t} * \frac{\Delta \text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} + \alpha_{10} \text{Inv}_{i,t} * \frac{\Delta \text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} + \sum \text{Industry} + \sum \text{Year} + \varepsilon_{i,t}. \tag{1}$$

In order to explore the moderating effect of executive compensation between innovation investment and the value of cash holdings, the cross-multiplier term including executive compensation incentive is introduced to establish model (2). In model (2), executive compensation is shown by executive monetary compensation (MC), equity compensation (EC), and in-service consumption (CC), respectively. The monetary compensation is measured by the natural logarithm of the total compensation of the top three executives [52]. Equity compensation is measured by the shareholding ratio of executives [53]; in-service consumption is measured by the ratio of administrative expenses to operating income [54]. When $\beta_{13} > 0$, it indicates that executive compensation has a positive moderating effect. When $\beta_{13} < 0$, it indicates that executive compensation has a negative moderating effect.

$$\begin{aligned} r_{i,t} - R_{i,t} = {} & \beta_0 + \beta_1 \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \beta_2 \frac{\Delta \text{Earning}_{i,t}}{\text{MV}_{i,t-1}} + \beta_3 \frac{\Delta \text{NA}_{i,t}}{\text{MV}_{i,t-1}} + \beta_4 \frac{\Delta \text{Int}_{i,t}}{\text{MV}_{i,t-1}} + \beta_5 \frac{\Delta \text{Divi}_{i,t}}{\text{MV}_{i,t-1}} + \beta_6 \frac{\text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} \\ & + \beta_7 \text{Lev}_{i,t} + \beta_8 \frac{\text{Cash}_{i,t-1}}{\text{MV}_{i,t-1}} * \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \beta_9 \text{Lev}_{i,t} * \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \beta_{10} \text{Inv}_{i,t} * \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \beta_{11} E_{i,t} * \text{Inv}_{i,t} \\ & + \beta_{12} E_{i,t} * \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \beta_{13} E_{i,t} * \text{Inv}_{i,t} * \frac{\Delta \text{Cash}_{i,t}}{\text{MV}_{i,t-1}} + \sum \text{Industry} + \sum \text{Year} + \varepsilon_{i,t}. \end{aligned} \tag{2}$$

In order to reduce the impact of heteroscedasticity on the model, this paper conducted logarithmic processing on the variables with large values and divided each variable by the initial market value of the company to reduce the impact of the company size on the model. If the variable in the model is preceded by Δ, it is the change of the value of the variable in the current period and the previous period.

The definition of the main variables in the model is shown in Table 1. The measurement of interest expense refers to the study of Baohong and Danting [55] and is shown by financial expense. The measurement of a company's market value refers to the research of Xudong et al. [56] and is measured by the product of the total number of shares issued by a company and the annual closing price.

4. Empirical Analysis

4.1. Descriptive Statistics. The descriptive statistical results of the research samples are shown in Table 2. The average excess return rate of stocks is −0.002, indicating that, on average, the return rate of individual stocks in the stock market is the same as the average return rate of the stock market. The standard deviation of executive monetary compensation is relatively large, indicating that the difference in executive monetary compensation of listed

Table 1: Variable definition table.

Variable symbol	Variable name	Variable definition	Variable reference
r-R	Excess return on stocks	Return on individual shares-the average return on the stock market	Based on Faulkender and Wang's [9] practice, the research model is constructed and the main variables are defined. According to the practice of Baohong and Danting [55], interest expense is measured by financial expense. According to the practice of Xudong et al. [56], the market value of a company is measured by the product of the total number of shares issued by the company and the annual closing price.
Cash	Cash and Cash equivalents	Amounts of cash and cash equivalents	
MV	Company market value	Total number of shares issued ∗ year closing price	
Earning	Company earnings	Net profit	
NA	Shareholders' equity	Owner's equity amount	
Int	The interest payments	Amount of financial expense	
Divi	Spending on dividends	The dividend amount	
Lev	Asset-liability ratio	Total liabilities/total assets	
Inv	Innovation investment	Inv1: R&D amount/revenue Inv2: R&D amount/total assets	Refer to the practice of Feng and Qingyun [51] Refer to the practice of Lei et al. [57]
Pr	Nature of equity	It is 1 for state-owned enterprises and 0 for non-state-owned enterprises	Refer to the practice of Xudong et al. [56]
MC	Executive monetary compensation	Top three monetary salaries for senior executives	Refer to the practice of Zejiang et al. [52]
EC	Executive equity compensation	Proportion of executive shareholding	Refer to the practice of Songzhi and Guanggui [53]
CC	Executive in-service consumption	Management expense/operating income	Refer to the practice of Xinmin et al. [54]
Industry	Industry variables	Industry dummy variable	
Year	Year variable	Year dummy variable	

Table 2: Descriptive statistics.

Variable name		N	Mean	1/4 quantile	Median	3/4 quantile	Standard deviation	Minimum	Maximum
$r_{i,t} - R_{i,t}$		13230	−0.002	−0.221	−0.063	0.139	0.377	−0.759	1.556
$\Delta Cash_{i,t}/MV_{i,t-1}$		13230	0.019	−0.021	0.006	0.043	0.092	−0.233	0.436
$\Delta Earning_{i,t}/MV_{i,t-1}$		13230	0.004	−0.007	0.003	0.014	0.047	−0.173	0.230
$\Delta NA_{i,t}/MV_{i,t-1}$		13230	0.058	0.007	0.027	0.067	0.116	−0.166	0.693
$\Delta Int_{i,t}/MV_{i,t-1}$		13230	0.001	−0.001	0.000	0.003	0.008	−0.024	0.037
$\Delta Divi_{i,t}/MV_{i,t-1}$		13230	0.000	0.000	0.000	0.000	0.002	−0.008	0.010
$Cash_{i,t-1}/MV_{i,t-1}$		13230	0.181	0.063	0.122	0.226	0.184	0.010	1.053
$Lev_{i,t}$		13230	0.458	0.307	0.460	0.609	0.196	0.069	0.862
$Inv1_{i,t}$		13230	0.004	0.000	0.000	0.000	0.013	0.000	0.093
$Inv2_{i,t}$		13230	0.002	0.000	0.000	0.000	0.006	0.000	0.037
$E_{i,t}$	$MC_{i,t}$	13230	14.510	14.037	14.482	14.920	0.745	5.009	18.049
	$EC_{i,t}$	13230	0.050	0.000	0.000	0.012	0.117	0.000	0.749
	$CC_{i,t}$	13230	0.084	0.039	0.066	0.102	0.106	0.001	7.284

Table 3: Regression results of innovation investment, executive compensation, and the value of cash holdings.

Variable name	Hypothesis (1)	Hypothesis (2)		
		E = MC	E = EC	E = CC
$\Delta Cash_{i,t}/MV_{i,t-1}$	0.179***	0.175***	0.179***	0.175***
	(4.945)	(4.828)	(4.948)	(4.805)
$\Delta Earning_{i,t}/MV_{i,t-1}$	1.189***	1.189***	1.189***	1.191***
	(21.528)	(21.513)	(21.530)	(21.556)
$\Delta NA_{i,t}/MV_{i,t-1}$	0.180***	0.181***	0.180***	0.179***
	(7.005)	(7.047)	(7.006)	(6.980)
$\Delta Int_{i,t}/MV_{i,t-1}$	−0.594*	−0.600*	−0.594*	−0.594*
	(−1.935)	(−1.951)	(−1.932)	(−1.932)
$\Delta Divi_{i,t}/MV_{i,t-1}$	−1.235	−1.177	−1.247	−1.256
	(−0.961)	(−0.915)	(−0.970)	(−0.977)
$Cash_{i,t-1}/MV_{i,t-1} * \Delta Cash_{i,t}/MV_{i,t-1}$	0.127***	0.128***	0.127***	0.127***
	(8.354)	(8.411)	(8.360)	(8.359)
$Lev_{i,t}$	−0.059***	−0.059***	−0.060***	−0.059***
	(−4.119)	(−4.100)	(−4.157)	(−4.152)
$Cash_{i,t-1}/MV_{i,t-1}$	−0.002	−0.001	−0.002	−0.002
	(−1.042)	(−0.730)	(−1.118)	(−1.022)
$Lev_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.004	−0.004	−0.004	−0.004
	(−1.616)	(−1.414)	(−1.352)	(−1.510)
$Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	0.008**	0.009**	0.009***	0.007*
	(2.417)	(2.475)	(2.586)	(1.956)
$E_{i,t} * Inv_{i,t}$		0.001	0.003	0.002
		(0.316)	(1.061)	(1.651)
$E_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$		−0.002	0.003	0.001
		(−1.107)	(0.959)	(0.423)
$E_{i,t} * Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$		0.001	0.010**	0.005**
		(0.397)	(2.460)	(1.952)
Constant	−0.073***	−0.073***	−0.072***	−0.073***
	(−3.220)	(−3.230)	(−3.187)	(−3.203)
Year	Control	Control	Control	Control
Industry	Control	Control	Control	Control
N	13230	13230	13230	13230
Adj-R^2	0.142	0.142	0.143	0.143
F value	64.358	59.116	59.334	59.358

***, **, and * denote rejection of the test at 1%, 5%, and 10% level, respectively.

Table 4: Test results of instrumental variable method.

Variable name	First stage	Second stage
$Inv_{i,t} * \Delta Cash_{i,t}$	50.162***	0.066**
	(19.350)	(2.320)
$\Delta Cash_{i,t}/MV_{i,t-1}$	−2.906***	0.529***
	(−21.720)	(8.526)
$\Delta Earning_{i,t}/MV_{i,t-1}$	−0.123	1.464***
	(−0.870)	(18.866)
$\Delta NA_{i,t}/MV_{i,t-1}$	0.135*	0.179***
	(1.920)	(4.592)
$\Delta Int_{i,t}/MV_{i,t-1}$	−1.085	−0.747*
	(−1.350)	(−1.686)
$\Delta Divi_{i,t}/MV_{i,t-1}$	−0.581	0.587
	(−0.170)	(0.320)
$Cash_{i,t-1}/MV_{i,t-1}$	−0.101*	0.521***
	(−1.760)	(16.525)

Table 4: Continued.

Variable name	First stage	Second stage
$\text{Lev}_{i,t}$	0.153**	0.014
	(2.070)	(0.331)
$\text{Cash}_{i,t-1}/\text{MV}_{i,t-1} * \Delta\text{Cash}_{i,t}/\text{MV}_{i,t-1}$	−0.016***	−0.007***
	(−3.440)	(−2.727)
$\text{Lev}_{i,t} * \Delta\text{Cash}_{i,t}/\text{MV}_{i,t-1}$	−0.004	−0.001
	(−0.560)	(−0.285)
N	13230	13230
Adj-R^2		0.072
F value	374.380	104.725

***, **, and * denote rejection of the test at 1%, 5%, and 10% level, respectively.

Table 5: Propensity score matching test.

Variable name	Match	Treatment group	Control group	T value	P value
$\Delta\text{Cash}_{i,t}/\text{MV}_{i,t-1}$	Before	0.018	0.019	−0.340	0.737
	After	0.018	0.019	−0.230	0.819
$\Delta\text{Earning}_{i,t}/\text{MV}_{i,t-1}$	Before	0.004	0.004	−0.190	0.846
	After	0.004	0.004	0.030	0.980
$\Delta\text{NA}_{i,t}/\text{MV}_{i,t-1}$	Before	0.057	0.059	−0.560	0.576
	After	0.057	0.059	−0.480	0.631
$\Delta\text{Int}_{i,t}/\text{MV}_{i,t-1}$	Before	0.001	0.001	1.480	0.138
	After	0.001	0.001	0.680	0.496
$\Delta\text{Divi}_{i,t}/\text{MV}_{i,t-1}$	Before	$9.90E-05$	$6.20E-05$	0.950	0.341
	After	$9.90E-05$	$9.30E-05$	0.110	0.908
$\text{Cash}_{i,t-1}/\text{MV}_{i,t-1}$	Before	0.169	0.184	−4.040	0.000
	After	0.169	0.166	0.680	0.499
$\text{Lev}_{i,t}$	Before	0.459	0.458	0.350	0.729
	After	0.459	0.455	0.830	0.405
$\text{Cash}_{i,t-1}/\text{MV}_{i,t-1} * \Delta\text{Cash}_{i,t}/\text{MV}_{i,t-1}$	Before	0.024	0.003	0.550	0.585
	After	0.024	0.005	0.440	0.663
$\text{Lev}_{i,t} * \Delta\text{Cash}_{i,t}/\text{MV}_{i,t-1}$	Before	0.128	0.170	−1.650	0.100
	After	0.128	0.118	0.360	0.720

***, **, and * denote rejection of the test at 1%, 5%, and 10% level, respectively.

companies is obvious. The minimum shareholding ratio of senior executives is 0, indicating the year in which senior executives do not hold shares. There is a big difference between the maximum and minimum of the in-service consumption of senior executives, indicating that the resources they can enjoy are very different. The maximum value of the asset-liability ratio is 0.862, and the minimum value is 0.069, indicating that the listed companies have great differences in financial leverage and great differences in financial risk, while the average value is 0.460, indicating that the overall leverage ratio of listed companies is not high. The minimum value of innovation investment is 0, indicating that the company has no innovation investment year.

4.2. Analysis of Regression Results. It can be seen from the regression results (Table 3) that α_1 in hypothesis (1) is 0.179, greater than 0, and significant at the 1% level, indicating that the change of cash of listed companies has a positive effect on the value of cash holdings in the company. The coefficient of the cross-term (α_{10}) is 0.008, greater than 0, and is significant at the level of 5%, indicating that innovation investment has a positive impact on the value of cash holdings. Therefore, hypothesis (1) is proved. From the regression results of the moderating effect, the monetary compensation of executives has a positive moderating effect on the relationship between innovation investment and the value of cash holdings, but the effect is not significant, which needs further analysis.

Table 6: Robustness test results.

Variable name	Hypothesis (1) Inv = Inv2	Regression results (after matching samples)	Hypothesis (2) Inv = Inv2		
			E = MC	E = EC	E = JC
$\Delta Cash_{i,t}/MV_{i,t-1}$	0.181***	0.203***	0.176***	0.186***	0.181***
	(4.988)	(5.029)	(4.827)	(5.131)	(5.001)
$\Delta Earning_{i,t}/MV_{i,t-1}$	1.189***	1.184***	1.189***	1.191***	1.191***
	(21.524)	(19.134)	(21.513)	(21.549)	(21.552)
$\Delta NA_{i,t}/MV_{i,t-1}$	0.180***	0.180***	0.182***	0.180***	0.179***
	(7.012)	(6.270)	(7.063)	(7.012)	(6.953)
$\Delta Int_{i,t}/MV_{i,t-1}$	−0.594*	−0.570	−0.600*	−0.587*	−0.595*
	(−1.935)	(−1.644)	(−1.952)	(−1.909)	(−1.937)
$\Delta Divi_{i,t}/MV_{i,t-1}$	−1.233	−0.728	−1.166	−1.217	−1.267
	(−0.960)	(−0.511)	(−0.907)	(−0.947)	(−0.986)
$Cash_{i,t-1}/MV_{i,t-1}$	0.127***	0.132***	0.128***	0.127***	0.127***
	(8.338)	(7.520)	(8.407)	(8.341)	(8.326)
$Lev_{i,t}$	−0.058***	−0.062***	−0.058***	−0.059***	−0.059***
	(−4.092)	(−3.924)	(−4.079)	(−4.140)	(−4.107)
$Cash_{i,t-1}/MV_{i,t-1} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.002	−0.002	−0.001	−0.002	−0.002
	(−1.105)	(−0.961)	(−0.887)	(−1.147)	(−1.039)
$Lev_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.004	−0.005*	−0.004	−0.004	−0.004
	(−1.601)	(−1.738)	(−1.384)	(−1.333)	(−1.505)
$Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	0.009***	0.008**	0.008**	0.011***	0.010***
	(2.657)	(2.207)	(2.501)	(3.236)	(2.855)
$E_{i,t} * Inv_{i,t}$			0.001	0.003	0.005*
			(0.655)	(1.291)	(2.735)
$E_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$			−0.002	0.004	0.002
			(−1.102)	(1.196)	(0.523)
$E_{i,t} * Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$			0.002	0.010**	0.006*
			(0.543)	(2.160)	(1.901)
Constant	−0.073***	−0.061**	−0.074***	−0.073***	−0.073***
	(−3.229)	(−2.466)	(−3.241)	(−3.191)	(−3.225)
Year	Control	Control	Control	Control	Control
Industry	Control	Control	Control	Control	Control
N	13230	11075	13230	13230	13230
Adj-R^2	0.142	0.143	0.142	0.143	0.143
F value	64.392	54.283	59.135	59.418	59.338

***, **, and * denote rejection of the test at 1%, 5%, and 10% level, respectively.

The moderating coefficients of equity compensation and in-service consumption are 0.010 and 0.007, respectively, greater than 0, and both are significant at the level of 5%. These results indicate that executive equity compensation and in-service consumption are motivational factors and have a significant positive moderating effect on the relationship between innovation investment and the value of cash holdings.

5. Robustness Test

5.1. Endogenous Remission

5.1.1. Instrumental Variable Method. The instrumental variable method was used to alleviate the possible endogenous problems in the model. Referring to the practice of scholars, the average value of industry and year innovation input is taken as the instrumental variable of innovation input to carry out two-stage regression. The regression results are shown in Table 4.

In the first stage regression, the instrumental variable and the replaced variable have a significant positive correlation. In the second stage regression, there is a positive correlation between instrumental variables and dependent variables, which is significant at the level of 1%. In the test of weak instrumental variables, the F value is 374.383, much higher than 10, and there is no problem with weak instrumental variables. Therefore, after considering the endogeneity of innovation investment, the positive correlation between innovation investment and the value of cash holdings is still significant.

5.1.2. Propensity Score Matching (PSM). Using the propensity score matching method to test can reduce the endogeneity problem caused by the self-selection of samples. Enterprises with innovative investments in the current year shall be treated as the processing group. Enterprises that have not made innovation investments in the current year

are regarded as the control group. The results of the propensity score matching test are shown in Table 5. By using the nearest neighbor matching method for sample matching, the P values of other variables except Levi are significantly larger than 0.1, indicating a good matching effect. The matched samples were used for regression, and the regression coefficient of the cross-product term was 0.008, which was significant at the level of 5%, indicating that the positive effect of innovation investment on cash holding value was still robust, excluding the impact of sample self-selection.

5.2. Substitution Variables. Referring to the research methods of previous scholars, the ratio of R&D investment to total assets (Inv2) is taken as a substitute variable for enterprise innovation investment [57], and the robust regression results are shown in Table 6. The coefficient of the cross-term between innovation investment and $\triangle \text{Cash}_{i,t}/\text{MV}_{i,t-1}$ is positive and significant at the level of 1%, indicating that innovation investment has a positive effect on the value of cash holdings.

The cross coefficient of equity compensation of executives, innovation investment, and $\triangle \text{Cash}_{i,t}/\text{MV}_{i,t-1}$ is 0.01, greater than 0, and significant at 5%, indicating that equity compensation of executives is a motivational factor and has a positive moderating effect on the relationship between innovation investment and the value of cash holdings. The coefficient of in-service consumption, innovation investment, and $\triangle \text{Cash}_{i,t}/\text{MV}_{i,t-1}$ is 0.006, greater than 0, and significant at 10%, indicating that in-service consumption of executives is a motivational factor and has a positive moderating effect on innovation investment and cash holding value. However, the coefficient of executive monetary compensation, innovation investment, and $\triangle \text{Cash}_{i,t}/\text{MV}_{i,t-1}$ is 0.002, but not significant, indicating that the attribute of executive monetary compensation needs to be further verified.

6. Further Research

6.1. Analysis of Incentive Factors of Executive Monetary Compensation Adjustment

6.1.1. Verification Method 1. Threshold regression analysis of the moderating effect of executive monetary compensation.

According to the above empirical results, it has been confirmed that executive equity compensation and in-service consumption both have a significant positive moderating effect on the relationship between innovation investment and the value of cash holdings, indicating that executive equity compensation and in-service consumption are motivational factors. However, the positive moderating effect of executive monetary compensation on innovation investment and the value of cash holdings is not significant.

Just as the above theoretical analysis, based on the hygiene motivational factors, in the monetary compensation of corporate executives, the salary and bonus have the attribute of a hygiene factor, while the compensation exceeding salary and bonus has the attribute of a motivational factor.

In order to verify the theoretical analysis conclusions, the threshold effect model is used to test the moderating effect of executive monetary compensation on the relationship between innovation investment and the value of cash holdings in stages. When the executive monetary compensation exceeds a certain threshold, the study examines whether the executive monetary compensation has the attribute of a motivational factor.

Therefore, the following hypothesis is proposed: when the executive monetary compensation is higher than a certain threshold, the motivational effect is reflected, and it has a significant positive moderating effect on the relationship between innovation investment and the value of cash holdings.

In order to ensure the continuity and rigor of the research, the samples from the above studies continue to be used. 10320 balanced panel data from 1470 listed companies were selected for analysis and model (3) was established. $q_{i,t}$ ($E_{i,t}$) is the threshold variable; "γ" is the threshold value; and "I" is an indicator function. The indicator function "I" takes on the value 1 if the conditions in parentheses are met and 0 otherwise. Firstly, the significance level of the threshold effect was tested. The threshold effect test results are shown in Table 7, and the threshold regression results are shown in the second column of Table 8. The results of the double threshold model and triple threshold model were not significant, while the single threshold model passed the test of the threshold effect. It shows that there is a threshold effect of executive monetary compensation in the moderating effect of executive monetary compensation between innovation investment and the value of cash holdings.

Table 7: Threshold effect test results.

Threshold model	Threshold estimate	F value	P value	Significant level critical value		
				1%	5%	10%
Single threshold	15.294	8.910	0.067	12.949	9.749	7.574
Dual threshold	13.400, 15.294	1.150	0.933	12.888	10.094	8.191
Triple threshold	13.400, 14.681, 15.294	2.640	0.853	17.917	14.000	11.710

$$\begin{aligned} r_{i,t} - R_{i,t} = {} & \lambda_0 + \lambda_1 \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} + \lambda_2 \frac{\Delta \mathrm{Earning}_{i,t}}{\mathrm{MV}_{i,t-1}} + \lambda_3 \frac{\Delta \mathrm{NA}_{i,t}}{\mathrm{MV}_{i,t-1}} + \lambda_4 \frac{\Delta \mathrm{Int}_{i,t}}{\mathrm{MV}_{i,t-1}} + \lambda_5 \frac{\Delta \mathrm{Divi}_{i,t}}{\mathrm{MV}_{i,t-1}} \\ & + \lambda_6 \frac{\mathrm{Cash}_{i,t-1}}{\mathrm{MV}_{i,t-1}} + \lambda_7 \mathrm{Lev}_{i,t} + \lambda_8 \frac{\mathrm{Cash}_{i,t-1}}{\mathrm{MV}_{i,t-1}} * \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} + \lambda_9 \mathrm{Lev}_{i,t} * \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} \\ & + \lambda_{10} \mathrm{Inv}_{i,t} * \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} + \lambda_{11} E_{i,t} * \mathrm{Inv}_{i,t} + \lambda_{12} E_{i,t} * \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} \\ & + \lambda_{13} E_{i,t} * \mathrm{Inv}_{i,t} * \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} * I(\mathrm{q}_i, t < \gamma) + \lambda_{14} E_{i,t} * \mathrm{Inv}_{i,t} * \frac{\Delta \mathrm{Cash}_{i,t}}{\mathrm{MV}_{i,t-1}} * I(\mathrm{q}_i, t \geq \gamma) \\ & + \sum \mathrm{Industry} + \sum \mathrm{Year} + \varepsilon_{i,t}. \end{aligned} \tag{3}$$

According to the regression results of the threshold model, the moderating effects of executive monetary compensation between innovation investment and the value of cash holdings are different under different levels of executive monetary compensation. In the first interval of executive monetary compensation, λ_{13} fails to pass the significance level test, indicating that when executive monetary compensation is lower than the threshold value, executive monetary compensation does not have the attribute of motivational factor and has no significant positive moderating effect on the relationship between innovation investment and the value of cash holdings. In the second interval, λ_{14} is 0.022, which is greater than 0 and significant at the 1% level, indicating that when the executive monetary compensation is higher than the threshold, the executive monetary compensation has the property of motivational factor and has a significant positive moderating effect on the relationship between innovation investment and the value of cash holdings.

6.1.2. Verification Method 2. Moderating effect analysis of executive excess monetary compensation.

The threshold regression model can be used to better test the interval difference of executive monetary compensation from the perspective of quantity. In order to more comprehensively test the difference of motivational factor attributes in different sections of executive monetary compensation, we can also start from the perspective of executive excess monetary compensation. Executive excess monetary compensation is part of executive monetary compensation above the normal level. The part of executive monetary compensation above the normal level has little relationship with the executive's established salary and bonus, so it should not be a hygiene factor but should be a motivational factor. Therefore, if the executive monetary compensation is divided into excess executive monetary compensation and non-excess executive monetary compensation for a comparative study, the moderating effect of executive monetary compensation on the relationship between innovation investment and the value of cash holdings can be more clearly compared. Based on the hygiene motivational factors, if the executive compensation exceeding a certain threshold is reflected as the incentive attribute, the positive moderating effect of executive excess monetary compensation between innovation investment and the value of cash holdings should be more significant than that of non-excess executive compensation. Referring to the research of Mengjie and Zhinan [58], overpay is measured by the difference between the actual monetary compensation of the top three executives and the normal monetary compensation estimated by the compensation decision model.

In the model for estimating executive monetary compensation, factors such as company size (Size), return on assets (Roa), ratio of intangible assets to total assets (IA), and company registration place (Zone) are controlled (model 3). Meanwhile, a calculation model for executive excess monetary compensation (model 4) is constructed. Using the research samples in the above study, 10320 balanced panel data of 1470 listed companies were selected for the empirical test. The test results are shown in Table 8. In the Inv = Inv1 group, the coefficient of the positive moderating effect of excess executive compensation is 0.018, which is significant at 5% level, far greater than the positive moderating effect of non-excess executive compensation between innovation investment and the value of cash holdings (the coefficient is 0.001), and the empirical P value is 0.020. Therefore, the positive moderating effect of excess executive monetary compensation on innovation investment and the value of cash holdings is significantly stronger than that of non-

Table 8: Results of further research analysis 1.

Variable name	Threshold regression	Inv = Inv1		Inv = Inv2	
		Excess executive compensation	Non-excess executive compensation	Excess executive compensation	Non-excess executive compensation
$\Delta Cash_{i,t}/MV_{i,t-1}$	0.053***	0.145*	0.241***	0.150**	0.244***
	(8.690)	(3.577)	(2.018)	(3.642)	(1.953)
$\Delta Earning_{i,t}/MV_{i,t-1}$	0.077***	1.203***	1.184***	1.205***	1.183***
	(18.960)	(15.903)	(14.494)	(15.907)	(14.478)
$\Delta NA_{i,t}/MV_{i,t-1}$	0.189***	0.217***	0.158***	0.218***	0.158***
	(4.930)	(4.748)	(5.322)	(4.779)	(5.300)
$\Delta Int_{i,t}/MV_{i,t-1}$	−0.832*	−0.263	−1.004**	−0.262	−0.998**
	(−1.890)	(−2.422)	(−0.566)	(−2.409)	(−0.569)
$\Delta Divi_{i,t}/MV_{i,t-1}$	0.713	−1.006	−1.210	−1.001	−1.250
	(0.390)	(−0.724)	(−0.497)	(−0.749)	(−0.500)
$Cash_{i,t-1}/MV_{i,t-1}$	0.522***	0.157***	0.108***	0.160***	0.108***
	(16.700)	(5.432)	(6.612)	(5.460)	(6.508)
$Lev_{i,t}$	0.020	−0.055***	−0.058***	−0.057***	−0.058***
	(0.500)	(−3.000)	(−2.663)	(−3.002)	(−2.601)
$Cash_{i,t-1}/MV_{i,t-1} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.007***	−0.002	−0.002	−0.003	−0.002
	(−2.820)	(−0.977)	(−0.933)	(−1.024)	(−0.759)
$Lev_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.002	−0.004	−0.004	−0.004	−0.004
	(−0.580)	(−1.086)	(−1.022)	(−1.082)	(−1.060)
$Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	0.006	−0.014	0.015	−0.015*	0.018**
	(1.200)	(1.522)	(−1.614)	(−1.829)	(1.972)
$E_{i,t} * Inv_{i,t}$	0.012**	0.001	−0.002	0.005*	−0.005
	(2.440)	(−0.451)	(0.522)	(1.867)	(−1.220)
$E_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.005	−0.002	0.002	−0.002	0.001
	(−1.65)	(0.446)	(−0.392)	(0.238)	(−0.407)
$E_{i,t} * Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	#−0.006/0.022***	0.018**	0.001	0.020***	−0.001
	(−0.810)/(3.090)	(2.550)	(0.093)	(2.799)	(−0.141)
Constant	−0.130***	−0.089***	−0.064**	−0.091***	−0.064**
	(−6.670)	(−2.708)	(−2.041)	(−2.754)	(−2.033)
N	13230	6417	6813	6417	6813
Adj-R^2		0.150	0.141	0.150	0.142
F value	77.21	30.453	30.036	30.520	30.254
Empirical P value		0.020		0.010	

Note. Standard # place: when $E_{i,t} < 15.294$, the coefficient is −0.006 and the t value is −0.810; when $E_{i,t} > 15.294$, the coefficient is 0.022 and the t value is 3.090. ***, **, and * denote rejection of the test at the 1%, 5%, and 10% level, respectively.

excess executive monetary compensation on innovation investment and the value of cash holdings. In the Inv = Inv2 group, the coefficient of positive moderating effect of excess executive compensation on innovation investment and the value of cash holdings is significant at 0.020, which is significant at 1% level, far greater than the positive moderating effect of non-excess executive compensation on innovation investment and the value of cash holdings (−0.001), and the empirical P value is 0.010. The empirical results both support the theoretical conclusion and prove the robustness of the conclusion.

$$E_{i,t} = \lambda_0 + \lambda_1 \text{Size}_{i,t} + \lambda_2 \text{Roa}_{i,t} + \lambda_3 \text{IA}_{i,t} + \lambda_4 \text{Zone}_{i,t} + \sum \text{Industry} + \sum \text{Year} + \varepsilon,$$
$$\text{Overpay}_{i,t} = E_{i,t} - \text{Expectedpay}_{i,t}. \tag{4}$$

6.2. The Possibility Test of Compensation Defense in Executive Monetary Compensation Adjustment. Based on the hygiene motivational factors, when executive monetary compensation is at a high level, it is reflected as a motivational factor and has a significant positive moderating effect on the relationship between innovation investment and the value of cash holdings. However, it is necessary to consider whether the possibility of compensation defense exists when the higher level of executive monetary compensation plays a positive incentive role.

In the face of the external pressure of pay fairness, executives of listed companies have the need and motivation for compensation defense. At the same time, the executive is the commander of enterprise innovation behavior and cash holding, which provides the feasibility of executive compensation defense. Of course, the pressure of executive compensation defense is mainly related to enterprises' performance improvement, enterprise strategic deployment, and other areas of high social concern. However, in order to ensure the rigor of the study, the possibility of executive monetary compensation defense should be tested. The pressure of compensation defense is different in different enterprises. In order to test whether executives have compensation defense behavior, it is necessary to analyze the difference in the adjustment effect of executive monetary compensation in different samples of enterprises.

Firstly, the executive compensation of state-owned enterprises is more likely to attract social attention and doubt. Therefore, when state-owned enterprises obtain excessive monetary compensation, they will be under greater external pressure, and the demand for compensation defense will be more obvious.

Secondly, if the increase in executive compensation is highly sensitive to the growth of corporate performance, that is, the increase of executive compensation is brought about by the growth of corporate performance, the public will have relatively few voices questioning the higher level of executive compensation. On the contrary, if the relationship between executive compensation and performance is not close, the public will raise doubts about the higher level of executive compensation and the pressure on executive compensation defense will increase significantly.

Thirdly, institutional investors have more professional advantages than ordinary investors. At the same time, institutional investors have a stronger ability to interpret executive compensation and better understand the value of the company, so the possibility of executive compensation defense is lower. Therefore, when the shareholding ratio of institutional investors is high, the possibility of compensation defense of senior executives is less. On the contrary, when the shareholding ratio of institutional investors is low, the possibility of compensation defense of senior officials is greater.

To summarize the above three points, if the enterprise is state-owned and executive monetary compensation has a strong positive moderating effect on the relationship between innovation investment and the value of cash holdings, it will indicate that executive compensation defense behavior affects the moderating effect of executive monetary compensation between innovation investment and the value of cash holdings. On the contrary, if the monetary compensation of executives has a weak positive moderating effect, it will indicate that the executive compensation defense behavior does not affect the relationship between innovation investment and the value of cash holdings.

If the sensitivity of compensation performance is low and executive monetary compensation has a strong positive moderating effect on the relationship between innovation investment and the value of cash holdings, it will indicate that executive compensation defense behavior affects the moderating effect of executive monetary compensation on the relationship between innovation investment and the value of cash holdings. On the contrary, if the monetary compensation of executives has a weak positive moderating effect, it will indicate that the executive compensation defense behavior does not affect the relationship between the innovation investment and the value of cash holdings.

If the proportion of institutional investors is high and the monetary compensation has a strong positive moderating effect on the relationship between innovation investment and the value of cash holdings, it will indicate that the executive compensation defense behavior affects the moderating effect on the relationship between the monetary compensation and the innovation investment and the value of cash holdings. On the contrary, if the monetary compensation of executives has a weak positive moderating effect, it will indicate that the executive compensation defense behavior does not affect the relationship between the innovation investment and the value of cash holdings.

Table 9: Results of further research analysis 2.

Variable name	State-owned	Non-state-owned	High performance sensitivity	Low performance sensitivity	High proportion of institutional ownership	Low proportion of institutional ownership
$\Delta Cash_{i,t}/MV_{i,t-1}$	0.100 (1.284)	0.186** (2.051)	0.136 (1.626)	0.162** (1.998)	0.014 (0.170)	0.264*** (3.222)
$\Delta Earning_{i,t}/MV_{i,t-1}$	1.264*** (10.883)	1.105*** (8.917)	1.604*** (12.205)	0.782*** (7.174)	1.644*** (12.412)	0.807*** (7.422)
$\Delta NA_{i,t}/MV_{i,t-1}$	0.097* (1.738)	0.465*** (6.902)	0.235*** (3.751)	0.223*** (3.791)	0.162*** (2.689)	0.341*** (5.482)
$\Delta Int_{i,t}/MV_{i,t-1}$	−0.090 (−0.162)	−0.544 (−0.660)	−0.473 (−0.677)	0.045 (0.073)	−0.550 (−0.833)	0.011 (0.017)
$\Delta Divi_{i,t}/MV_{i,t-1}$	0.746 (0.293)	−2.991 (−0.799)	−4.301 (−1.319)	1.113 (0.397)	1.259 (0.439)	−4.647 (−1.392)
$Cash_{i,t-1}/MV_{i,t-1}$	0.147*** (4.950)	0.228*** (4.879)	0.174*** (4.762)	0.158*** (4.678)	0.121*** (3.530)	0.188*** (4.865)
$Lev_{i,t}$	−0.068** (−2.288)	−0.045 (−1.435)	−0.070** (−2.206)	−0.042 (−1.486)	−0.041 (−1.265)	−0.072** (−2.507)
$Cash_{i,t-1}/MV_{i,t-1} * \Delta Cash_{i,t}/MV_{i,t-1}$	0.000 (0.158)	−0.006 (−1.167)	0.001 (0.136)	−0.005 (−1.421)	0.001 (0.145)	−0.008** (−1.973)
$Lev_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.004 (−0.747)	−0.004 (−0.712)	−0.018*** (−3.199)	0.005 −0.994	−0.002 (−0.450)	−0.006 (−1.087)
$Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.001 (−0.187)	0.003 (0.422)	−0.002 (−0.336)	−0.001 (−0.137)	−0.011* (−1.675)	0.009 (1.222)
$E_{i,t} * Inv_{i,t}$	−0.004 (−0.809)	0.008 (1.577)	0.007 (1.501)	−0.002 (−0.519)	−0.004 (−0.902)	0.013*** (2.647)
$E_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	−0.002 (−0.422)	−0.004 (−0.701)	0.003 (0.524)	−0.001 (−0.219)	0.000 (0.031)	0.003 (0.622)
$E_{i,t} * Inv_{i,t} * \Delta Cash_{i,t}/MV_{i,t-1}$	0.009 (1.328)	0.015* (1.707)	0.018** (2.361)	0.008 (1.232)	0.023*** (2.986)	0.011 (1.579)
Constant	−0.049 (−1.004)	−0.149*** (−3.255)	−0.042 (−0.899)	−0.146*** (−3.182)	−0.094* (−1.889)	−0.087** (−2.013)
N	3227	3190	3280	3137	3208	3209
Adj-R^2	0.209	0.133	0.178	0.145	0.196	0.128
F value	22.798	13.469	18.918	14.245	20.836	12.552

***, **, and * denote rejection of the test at 1%, 5%, and 10% level, respectively.

In order to study whether executive compensation defense behavior exists in the relationship between innovation investment and the value of cash holdings, the sample of excess executive monetary compensation in the above study will continue to be used for analysis, and model 2 will be used for regression analysis. The empirical results are shown in Table 9.

Firstly, the samples are divided into state-owned enterprises and non-state-owned enterprises. In the non-state-owned enterprises, $\beta_{13} = 0.015$ and is significant at 10% level. In the state-owned enterprises' sample, $\beta_{13} = 0.009$, but not significant. Therefore, compared with non-state-owned enterprises, in state-owned enterprises, the positive moderating effect of executive compensation on the relationship between innovation investment and the value of cash holdings is not strong.

Secondly, referring to Kubo's method [59], the compensation performance sensitivity is calculated and the sample is divided into the group with high compensation performance sensitivity and the group with low compensation performance sensitivity by taking the median of compensation performance sensitivity as the dividing line. In the high-performance sensitivity sample, $\beta_{13} = 0.018$ and is significant at 5% level. In the low-performance sensitivity sample, $\beta_{13} = 0.008$, but not significant. Therefore, compared with enterprises with high compensation performance sensitivity, in enterprises with low compensation performance sensitivity, the positive moderating effect of executive compensation on the relationship between innovation investment and the value of cash holdings is not strong.

Thirdly, the sample is divided into the group with high institutional ownership and the group with low institutional ownership by taking the median institutional ownership as the boundary. In the sample with high institutional ownership, $\beta_{13} = 0.023$ and was significant at 1% level, while in the sample with low institutional ownership, $\beta_{13} = 0.011$, but not significant. Therefore, compared with enterprises with a low proportion of institutional investors, in enterprises with high proportions of institutional investors, the positive moderating effect of executive compensation on the relationship between innovation investment and the value of cash holdings is not strong.

In summary, the above test results do not meet the established conditions of the compensation defense hypothesis, indicating that the moderating effect of executive compensation on the relationship between innovation investment and the value of cash holdings is not affected by the compensation defense.

7. Discussion

Firstly, the most important innovation and research findings of this study are the differentiated moderating effects of different types of executive compensation incentives on corporate innovation and the value of cash holdings. In particular, the hygiene motivational factors theory is introduced, which makes the theoretical support of this study more solid. In China, monetary compensation incentive is the main way of executive incentive mechanism arrangement. The study may provide important ideas for the structure of executive compensation. In contrast, monetary compensation can achieve the incentive attribute only after it exceeds the threshold value. In other words, most of the monetary compensation only plays the role of the hygiene attribute. Should enterprises try to appropriately increase the proportion of equity compensation and in-service consumption, so as to increase the incentive effect? Of course, scholars have found that companies with institutional investors holding both stocks and bonds are more willing to adopt a compensation structure with lower risk, that is, fewer stock options and more internal debt, which also indicates a higher risk of equity-based compensation [60]. Other scholars have found that monetary compensation is more likely to increase agency conflicts, while equity compensation is more likely to decrease agency conflicts [61]. A scientific and reasonable executive compensation structure can effectively promote enterprise innovation [62]. Combined with the research results of many scholars, it can provide more ideas for enterprises to design the executive compensation system.

Secondly, it is necessary to rethink the problem of incentive compatibility. Based on the hygiene motivational factors theory, this study proposes the moderating effect of different executive compensation on the differentiation of innovation investment and the value of cash holdings. Incentive compatibility must be addressed in order to prevent executives from neglecting innovation by focusing on short-term performance. Some scholars have found that in the previous executive compensation arrangements of enterprises, executive compensation would be linked to performance, but it would lead to executives reducing the expenditure on innovation investment to meet the requirements of performance evaluation [63]. It is even possible to conduct earnings management behavior through innovation investment [64]. Because innovation investment is risky and has a long cycle, executives need to be mentally prepared to take risks for a long time and make sustained efforts. In order to make senior executives pay more attention to innovative activities rather than meet the short-term performance assessment, enterprises should constantly strengthen the embodiment of innovation orientation in the design of executive compensation.

Thirdly, although theoretical analysis and empirical test results support that executive compensation can play a positive moderating role, in combination with reality, we have to seriously consider whether more executive compensation is more appropriate. On the one hand, Executive compensation can play motivating effects, but excessive executive compensation may bring other disadvantages. Senior executives are limited by their individual abilities, which make the incentives for senior executives to work continuously. In particular, the promulgation of the salary limit order shows that while thinking about the market efficiency, we should give consideration to the market fairness. Fortunately, in further analysis, we do not find significant compensation defense behavior in the mechanism of executive compensation in innovation investment and cash holding value. But we still cannot guarantee that

executive pay is not justified in other areas. On the other hand, the increase in executive compensation can stimulate the incentive effect, but whether the incentive effect can last for a long time or whether there is a marginal diminishing effect between them, we can investigate it in future.

Fourthly, through the study of large sample data, we found that monetary compensation beyond the threshold value has an obvious motivational attribute, while monetary compensation within the threshold value has hygiene attribute. It is worth noting that the threshold value of monetary compensation will be affected by the industry and economic development period. Monetary compensation is greatly affected by the industries and regions [64]. Therefore, after the existence of the monetary compensation threshold has been proved, scholars should further explore the difference in the monetary compensation threshold of senior executives in different industries and regions. In practice, finding the threshold value of monetary compensation in different industries can better guide different enterprises to set up monetary compensation structures.

Finally, although this study draws conclusions through normative analysis and empirical testing methods, there are still some shortcomings. (1) Although this study has refined the research on the categories of executive compensation, there is still room for exploration on the refinement of enterprise innovation. Technological innovation in enterprises takes a long time from R&D input to output. If we can separately describe the mechanism of different links of enterprise innovation investment (innovation input, innovation achievement transformation, innovation value output, etc.) and enterprise cash holding value, it will make the research more full and complete. (2) The value of cash holdings is a marginal value. It is hard to measure exactly. Although this study has been empirically tested by referring to the measurement methods of previous scholars, it can ensure that the empirical results are consistent with those of previous scholars. However, it is still possible and necessary to explore a more scientific way to measure the value of cash holdings. (3) The objects of this study are mainly listed companies in China. This study enriches the economic research of developing countries. However, because the economic development level and institutional background of different countries and regions may be quite different, the research results may not be able to adapt to all different countries or regions.

8. Conclusions and Significance

8.1. Conclusions. In the context of innovation-driven development strategy, the promotion of enterprise value through executive compensation incentives has been a widely discussed topic. There are also great differences in the incentive effect of different types of executive compensation. Through theoretical analysis and the empirical test, this study is shown as follows.

(1) Innovation investment has a positive promoting effect on the value of cash holdings. (2) Based on the hygiene motivational factors theory, executive equity compensation and in-service consumption both have positive moderating effects on innovation investment and the value of cash holdings. That is to say, executive equity compensation and in-service consumption show motivational effects on their relationships. (3) When the level of executive monetary compensation exceeds the threshold, executive monetary compensation has a positive moderating effect on the relationship between innovation investment and the value of cash holdings, so it has the attribute of a motivational factor and is not disturbed by executive compensation defense behavior.

8.2. Significance. The theoretical significance of this study is as follows.

Firstly, the application extension of the hygiene motivational factors theory is extended, which is also the most important innovation of this research. This study creatively divides executive compensation into two parts: hygiene attributes and motivational attributes. Especially for monetary compensation, this study found that monetary compensation at different levels has different incentive attributes. When executive compensation plays different incentive attributes, it has different moderating effects on enterprise innovation and the value of cash holdings. This also brings the hygiene motivational factors theory, innovation theory, and enterprise value theory into the unified research framework and deepens the theoretical connection.

Secondly, the study enriches the theoretical research of cash value. Perhaps only studying the relationship between enterprise innovation behavior and enterprise value cannot become the focus of scholars; after all, the relevant research is relatively abundant. However, in the wake of the COVID-19 outbreak and the crisis at several US banks, companies are hoarding cash as a precaution. At this time, it is more important to study enterprise value from the perspective of cash. Innovation and enterprise value increment have always been important means for enterprises to pursue long-term sustainable development. At this time, it is more meaningful to enrich relevant theories.

Corresponding to the theoretical innovation significance, the practical significance of this research is equally important. The practical significance of this study is as follows.

Firstly, the study confirms that there is a significant positive correlation between innovation investment and the value of cash holdings, indicating that increasing innovation is the right choice for enterprises to improve cash value, which provides practical guidance for enterprises to increase R&D arrangements.

Secondly, the study introduces the hygiene motivational factors theory into the research of executive compensation incentives. Because different types of executive compensation and even different levels of executive types play different

incentive roles, this provides an important idea for enterprises to prudently arrange the compensation system.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This study was funded by Heilongjiang Province Philosophy and Social Sciences Research Planning Project (22JYC335).

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